

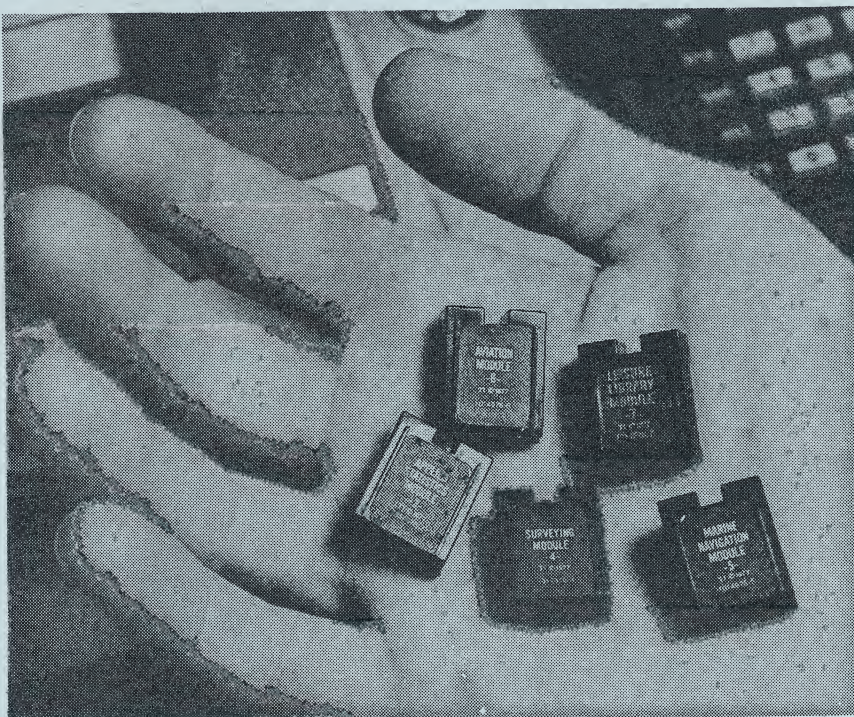
interactive computing

PRESS REVIEW

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THE NEXT COMPUTER REVOLUTION

The first one, largely unseen, transformed big business. The next one is taking place in the home, the office and the corner store.



These tiny modules contain programs for a Texas Instruments hand-held computer. Other modules can be purchased and programmed for a variety of functions, dependent only upon the particular needs of the individual owner.

by John Fletcher

AT HOME, you will have an earth station on the roof for satellite communication with any other home earth station in the country. Your television set will contain a powerful computer that regulates your house's heating and cooling systems, notifies fire depart-

ment or police in an emergency, does your taxes and lets you beat it in a game of chess. Your telephone will be a data entry system and calculator.

At work, everything will be computerized except the coffee breaks. Letters will be typed, orders will be placed, bills will be paid and files will be searched, all by computer. At the neighborhood shopping center, the

smallest merchant will have more computing power at his fingertips than was available in the largest and most costly computer of 1960. He will use it to keep track of inventory, to automatically reorder, to determine the most profitable mix of goods or services, to maintain payroll records and — like everyone else — to calculate taxes at the lowest legal amount.

The timetable for this computer revolution is unclear. It began, in bits and pieces, only within the last several years. Its impact is growing rapidly, and by 1988 will have transformed most offices and many small businesses. The effect on home life will take longer, but by 2000 it appears certain that computerization will be as common as indoor plumbing. Indeed, computers will control indoor — and outdoor — plumbing to conserve energy in heating water, to regulate automatic dishwashers and clothes washers, to engage lawn sprinklers at the optimum time.

Today, the technology to do all this — and far, far more — exists and is widely used by large corporations, government agencies and universities. They were the benefactors of the first computer revolution, a revolution that began in 1946 with the construction of the first electronic digital computer, a revolution so broad and deep that these institutions — big business, big government and big education — could not function as they do today, and in some areas perhaps not at all, without computers. Yet thirty-two years into this revolution, most people remain ignorant, distrustful, even fearful of computers. The computer remains an electronic ghost, a distant servant that cranks out phone bills and credit card statements, an infuriatingly unresponsive enemy that sends past-due notices for \$0.00 and two copies of a magazine after you renew your subscription.

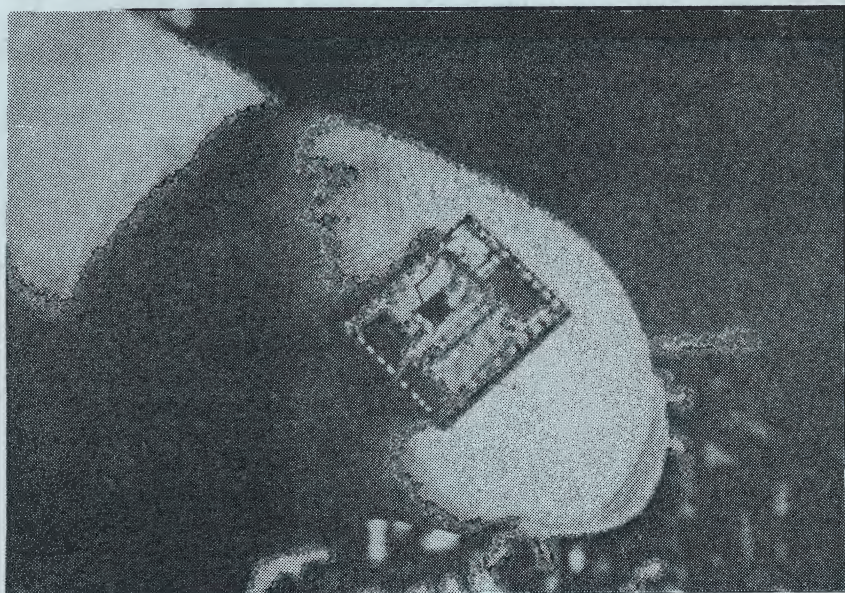
"Everyone has a horror story to tell about computers," says Dr. Egil Juliussen, a member of Texas Instruments' technical staff. "And so when you throw out the word 'computer' they get scared. But programmable video games in the consumer market can change that. These games are evolving into home computers. And by seeing the computer in the home, people will become comfortable with it. Their fear will go away when they see their kids playing with the computer."

Indeed, in the home computer revo-

lution the initial weapons will be games and the shock troops will be children. Computerized games that utilize the screen of the home TV set were introduced by Magnavox six years ago and have recently mushroomed in popularity. This year, according to one estimate, consumers will buy 10 million simple video games worth \$300 million, 200,000 programmable games worth \$250 million and 200,000 home computers worth \$100 million. In just two years, sales of simple games are expected to climb to 14 million units, sales of programmables to 8.5 million and sales of home computers to 900,000 —

By 2000 it appears certain that computerization in the home will be as common as indoor plumbing.

Photograph: Intel Corporation



altogether, about \$1.2 billion worth of computerized wizardry.

Perhaps more important than video games is that children are learning about computers in school and are eagerly embracing them as part of modern life. Most colleges and many high schools have courses in computer programming. Then, too, children and young adults are buying computer kits and assembling their own data processing systems at home. The build-it-yourself programmable electronic computer is becoming to this generation of youngsters what the A.C. Gilbert chemistry set was to their parents' generation. Whereas the smelly world of chemistry was the old scientific frontier, the silent world of electronics is the new one.

The early kits were sold largely through mail-order. But soon specialized retail stores opened and began selling kits and fully assembled computers: Computerland in northern California, The Computer Store in Massachusetts, Computer Power & Light in

This Intel microcomputer chip is as powerful as the large computers produced during the 1950s.

southern California, plus countless others. Initial sales were to computer operators and programmers who wanted their own computers at home. Soon, small businessmen, professionals and young hobbyists became

At the touch of a button, people will be able to produce from their television a printed copy of "Hamlet" or a rerun of "The Gong Show."

a part of the clientele. "The parents who come in are really flabbergasted at what a computer can do," says Loren Moore, manager of Computer Power & Light's Studio City store in Los Angeles. "But the kids aren't. They sit right down and start working with it. The parents try to slow them down, saying, 'Don't touch the keys, it might blow up.' But the kids say, 'No, it won't,' and start banging away. So we believe that the young generation won't be fearful of computers at all."

Although virtually all the experts agree that computerization to one degree or another will eventually come to the average American home, there are differences in opinion as to when and how. Some believe the computer will take twenty or thirty years to make significant inroads, while others see this happening within ten years. Then, too, some experts believe that this computerization will take the form of a single powerful unit, just as most homes have a single centralized heating system. Others, using electrical motors as their analogy, believe that the home will have many small computers.

"The people who will undertake real computer programming themselves for home and personal use are relatively small in number," says Frederic G. Withington, a senior staff member of Arthur D. Little, Inc., the Boston-based consulting firm. "The big market in the home is when the computer disappears into other products that do things people want, such as control the home heating system, its hot water system and so on. And that is going to be long in coming because you can't put it into present homes very well. You have to have the basic systems designed to be con-

trolled by computer, and that has to happen before the house is built."

In the view of Larry Wells, president of Creative Strategies, Inc., a San Jose consulting firm, "There are really not that many things that a consumer needs to do in the home where a programmable computer can be a really big help to him. And very few people know how to program. So I don't see the true home computer being that close. But in microprocessors—nonprogrammable computers—it's a different story. We're getting microprocessors in more and more consumer products—washers, dryers, automobiles, ovens, security systems, television sets, a lot of different places." Wells, too, believes that home computer programming will have to wait until the present younger generation is well-established in homes of its own. "It will take a generation to change," he says. "Twenty or thirty years from now, computers will permeate the home, but not ten years from now."

Harry Edelson, a research vice president with the brokerage firm of Drexel Burnham Lambert in New York, sees the change being sooner and deeper. "Some smart home builder is going to start wiring his new houses for a centralized computer to turn on and off lights automatically, to call the police department in case of a break-in and so on. And the idea will catch on very fast. It certainly didn't take long for calculators or video games to catch on, and a home computer makes a lot more sense. So I think over the next ten years or so, the computer will have a major influence in the home.

"In addition," he continues, "very closely tied to the use of the computer in the home will be the use of communications. Instead of wiring each city for cable TV, which is very costly, we will leapfrog that and send information via satellite to each home. I expect that each home will have an earth station on its roof or in the yard, which will enable the people to receive programming and to communicate with anyone else in the country."

Beyond that, some experts see the day—perhaps well into the twenty-first century—when the computer, satellite communications and other modern technology will be joined in a system that will make each television set a printing plant. People will have newspapers, magazines, even personal letters printed almost in-

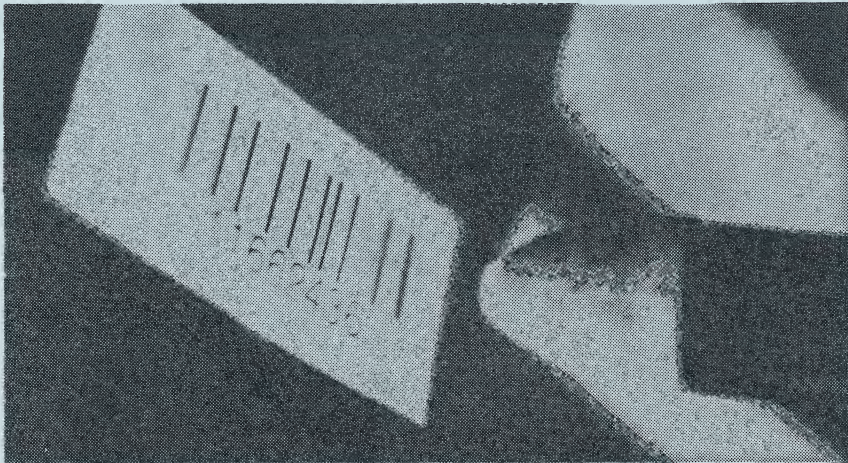
stantly and in full color. A modest apartment with a table top set will have the information storage capacity of today's neighborhood library; a house in the suburbs with a console model will rival the Library of Congress. At the touch of a button, people will be able to produce a printed copy of "Hamlet" or a rerun of "The Gong Show."

However huge and exotic the home market may prove to be, at the moment it is far smaller and growing less rapidly than the small business market. During the last few years, small businessmen, independent merchants and professionals on the one hand, and computer manufacturers and marketers on the other have discovered each other. The field was pioneered by small companies, notably Basic/Four, plus such others as Imsai, Wang Laboratories, Lomac, Qantel and Intelligent Systems Corporation. Then, too, the retail computer stores have been selling mainly to small businesses. Now, with the market estimated at \$2 billion or more a year, the giants are moving in: General Electric, IBM, Burroughs, Hewlett-Packard, NCR, TRW and, through its Qyx division, even Exxon, the oil company. As a result, the traditional lines of division within the industry are blurring. Until recently, big companies with extensive marketing and software capability—companies like IBM—built "main-frame" computers: big, super-fast machines that took three to five years to develop and cost from \$100,000 to \$5 million or, in special-purpose configuration, \$25 million. Smaller companies like Digital Equipment and Data General dominated the field of minicomputers, which were small computers that typically required only two years of development time and cost under \$100,000. The semiconductor manufacturers like Intel, which marketed the first microprocessor, and such others as National Semiconductor, Texas Instruments and Fairchild Camera & Equipment, had the microprocessor/microcomputer market to themselves.

The microprocessor/microcomputer, which further cut the size and cost of electronic data processing, changed all that. The microprocessor is a computer-on-a-chip that cannot be programmed whereas the microcomputer is a chip that can be programmed. They both opened new markets and spawned increased competition. Makers of minicomputers used micro

technology to upgrade their products to compete with mainframe models. Companies whose products utilized micro technology began invading the mini market. And mainframe makers

The computer is today's version of the Old West's Colt .45. It is the great equalizer.



By focusing a light wand upon a selected code, a malfunctioning computer is cataloged and its problem analyzed instantly. A similar technique can be applied to inventory control where, for example, the sale and the reduced number in stock of a purchased product is recorded automatically.

expanded downward into minis, again via micro technology. "The original use of microcomputers was in controlling industrial machinery," says Juliussen of Texas Instruments. "Now, they are in controls of home appliances like microwave ovens and dishwashers. And they are moving into the small business area, for use in word processing, accounting, inventory control and so on."

The applications in small business appear endless. An attorney's office can file information on a complex case and retrieve and categorize it within seconds. A mail-order house can automatically prepare individually typed letters from basic formats stored in its computer. Small contractors can speedily compile bids. A physician or dentist can keep his office's business records up-to-date by computer. "Nobody has yet dreamed of all the applications that are possible," says Edelson of Drexel Burnham Lambert.

Edelson looks to the day when small retailers will be computerized by their distributors, who would hope to lock-in a customer by providing him with computerized inventory control and ordering capabilities.

Already some distributors have done this for relatively large retail customers, and Edelson believes the practice will eventually reach the level of the corner store. "For example," he says, "take a pharmacy, which has thousands of items. Let's say the druggist stocks ten units of a certain item and wants to reorder whenever he gets down to three. Without a computer, he has to constantly monitor his shelves. But if his cash register were an electronic point-of-sale terminal and kept track of each sale by code number, then at the end of the day the druggist could

get a printout that would tell him which items he has to reorder. If the system were really sophisticated, it could automatically reorder directly from the distributor."

In the professions, the impact could be equally great. If medical books were converted to computerized information, a young doctor could have at his fingertips the same store of case histories that his older colleagues took years to acquire. An architect, working alone with a graphic display and stress simulator, could dash off variations of a design far faster than a battery of draftsmen and engineers using manual methods. And a small law office using a computer could have, in many respects, the same manpower of a much larger competitor. Instead of hiring law clerks to search a case file, an attorney could query his computer. Or, as at least one attorney already does, use it in liability suits to compute stress and failpoints in machinery. "The computer is often referred to as today's version of the Old West's Colt .45," says computer retailer Loren Moore. "It is the great equalizer."

Still, businessmen and profession-

als are wary of computer systems. Price is one reason. A version of the IBM Series/1 sells for \$29,000; so does Basic/Four's Model 200; Pertec Computer's MITS 300/50 is priced at \$16,000, while its 300/25 model is \$11,500; and Computer P&L sells a system for \$8,000. These systems are not directly comparable to one another, are all priced far lower than equivalent systems of one or two years ago and are hardly impulse items. Another problem, and one that is expected to prove more thorny, is that of programming. No computer works until it is told precisely what to do and how to do it. Yet small businessmen and professionals, just like almost everyone else, know virtually nothing about computer programming. "The problem is always programming the small business machine," explains Withington of Arthur D. Little. "Even though the areas are the same from one company to another — receivables, payroll, inventory and so on — each guy wants to do his own thing, has his own particular gimmick that he wants to use."

Some manufacturers are accommodating this by making it easier and easier for a novice to write his own program. "As the product evolves," says Withington, "you will be able to sit down in front of the screen and push a button and the screen will say, 'Hello, let's write a program. And it will lead you through all the options available and pretty soon, after an hour or so of talking to the machine, you have your program ready.'"

Regardless of how the programming situation is resolved, it is clear that computers in small businesses, in the professions and in the home will grow in use, decline in price and increase in impact. "People's lifestyles will change," predicts Gordon Bell, a vice president of Digital Computer Corporation. "Computers will be in every telephone, in every typewriter, in every copying machine, in every mechanism." Like the electric light bulb, automobiles, airplanes and television, computers will change the way people live and earn a living, the way they relate to one another and to themselves. The computer revolution, like the industrial revolution, is likely to have far more impact than those living through it can imagine. ●

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